

## Longfin Smelt

Longfin smelt abundance was low in 1997 (Figure 3), especially considering the potentially large number of spawners from the 1995 year-class and relatively good outflow conditions during the peak spawning and larval-rearing months of January and February. Such conditions should have produced an index as large or larger than 1995. It remains to be determined whether the low 1997 indices resulted from a large portion of the population rearing in the Gulf of the Farallones or poor recruitment.

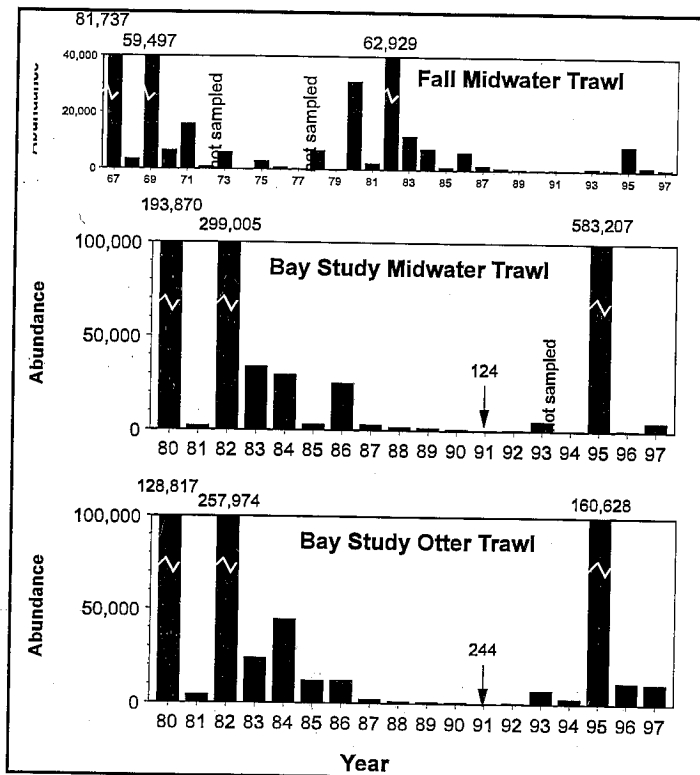


Figure 3. Longfin Smelt Annual Abundance Indices from the California Department of Fish and Game Fall Midwater Trawl Survey (all ages combined) and Delta Outflow-San Francisco Bay Survey Midwater and Otter Trawl Sampling

## Surfperch Abundance Trends in San Francisco Bay

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The surfperch family, *Embiotocidae*, ranges along the Pacific Coast from southern Alaska to central Baja California, and two species are found in the Sea of Japan. Of the 19 species found in California, all are marine except the tule perch, which is found in freshwater (Tarp 1952, Miller and Lea 1972). Surfperches use a variety of near-shore coastal and estuarine habitats- rocky or sandy surf, kelp forests, ocean reefs, and areas around structures such as pilings and piers (Karpov *et al.* 1995).

All surfperches are viviparous; small species reproduce at age 1 and larger species after age 1 (Baltz 1984). Most species mate in winter and store sperm for 3 to 9 months before fertilization (Carlisle *et al.* 1960, Anderson and Bryan 1970). Gestation lasts 3 to 6 months and the females of many species migrate into bays to give birth. Fecundity is low, averaging 3 to 40 young. The young are born fully developed and the males of many estuarine species mature soon after birth.

Many of the larger species of embiotocids are commercially important, although some may no longer be targeted due to declines in abundance. All species are important in the sport fishery except dwarf perch, which is too small.

Fourteen species of surfperches were collected in San Francisco Bay from 1980 to 1997 (Tables 1, 2, and 3). Our abundance analyses are focused on the commonly collected species which include shiner perch, pile perch, dwarf perch, barred surfperch, walleye surfperch, and white seaperch. All of these species, except the barred surfperch and walleye surfperch, are estuarine species and use estuaries and bays for part or most of their life cycle. Although the barred and walleye surfperches are considered coastal species, they were once common in San Francisco Bay.

Surfperches primarily use San Francisco Bay as a birthing and nursery area. The adults migrate into the estuary and remain in the deeper areas of the South and Central Bay and San Pablo Bay. Just before parturition, the females move into shallow areas. After parturition, the males of most estuarine species migrate to the shallows and mate with the females. Age-0 fish rear in the shallows while the adults move to deeper areas of the bay. Most adults emigrate from the bay and the age-0 fish migrate to deeper areas in fall. Age-0 shiner perch and dwarf perch remain in the bay through their first winter

while the age-0 fish of the other common species migrate out of the bay in winter.

Abundance of all the commonly collected species of surfperches has declined since the mid-1980s and has remained relatively low through 1997 (Figures 1-6). The age-0 walleye surfperch abundance index has been low since 1984 and the 1997 index of 95 follows this trend (Figure 1). In 1995, no age-0 walleye surfperch were collected.

Pile perch were once relatively common in San Francisco Bay, but abundance declined in 1986 (Figure 2). We have not collected any age-0 pile perch since 1989.

White seaperch abundance has declined since 1984. We have not collected any age-0 or older age classes since 1990 (Figure 3).

Barred surfperch abundance has been low since 1983 (Figure 4). The abundance index of all age classes has been < 100 since 1987 and remained low in 1997, with an index of 104.

Table 1. Total Catch of Surfperches in the Midwater Trawl from 1980 to 1997

Species	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	Total
Barred surfperch	1	1										1	1						4
Calico surfperch														1					1
Redtail surfperch																1			1
Shiner perch	406	1148	790	302	320	826	731	635	665	333	262	211	142	357	29	31	233	520	7421
Black perch						1													1
Walleye surfperch	41	207	72	22	78	40	29	67	35	36	26	15	15	21		11	28	11	743
Silver surfperch	1				1														2
Dwarf perch			1																1
White seaperch	11	23	3	3	1	1	1	13	5	5	1		1				1		69
Rubberlip seaperch								4											4
Pile perch	3	6	5	2	1	4	4	1	1			1							28
All	463	1385	871	329	401	872	765	720	706	374	289	228	159	379	29	43	262	531	8275

Table 2. Total Catch of Surfperches in the Otter Trawl from 1980 to 1987

Species	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	Total
Barred surfperch	19	29	16	48	19	6		7	3	4	4	3	1	1	2	4	1	3	170
Shiner perch	1654	1929	3167	1667	1015	1803	2730	1375	1402	433	649	412	283	259	204	413	271	575	20241
Black perch		13	3	4	12	4	1	1	3	3	2		4	4	3	2	9	12	80
Spotfin perch					1														1
Walleye surfperch	28	184	91	37	22	16	39	26	24	5	7	7	5	3	2		3	5	504
Silver surfperch	2							2											4
Rainbow seaperch				1															1
Dwarf perch	14	31	50	5			3	1	8	5	1	1							167
White seaperch	17	35	12	10	25	5	9	7	4	1	4								128
Rubberlip seaperch	2	3	2		2				1	1						1	1	1	14
Pile perch	36	34	38	35	9	19	19	1	16	3	1								211

The dwarf perch was common in the early 1980s but abundance of all age classes has decreased since 1983 (Figure 5). No dwarf perch has been collected since 1991.

The shiner perch is the most common surfperch collected in San Francisco Bay. Age-0 shiner perch abundance declined from 1988 to 1996 (Figure 6). The 1997 index is the highest since 1987.

It is unclear what factors have contributed to the decline of surfperches in this estuary, but other studies have shown a long-term decline in surfperch populations coast-wide (Karpov et al. 1995). Factors which may contribute to their decline include use of bays and estuaries during vulnerable life stages and low fecundity, which may make populations susceptible to overharvest.

### Literature Cited

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Table 3. Total Catch of Surfperches Collected in the Beach Seine from 1980 to 1986

Species	Year						Total
	80	81	82	83	84	86	
Barred surfperch	7	7	1	14		17	73
Calico surfperch				1		1	2
Shiner perch	618	529	181	482	248	403	3147
Black perch	2	8	1		4		17
Walleye surfperch	67	49	15	166	18	32	469
Silver surfperch						1	2
Dwarf perch	467	527	190	135	161	142	1936
White seaperch 1		7				2	11
Rubberlip seaperch		4	1				12
Pile perch	3	4		6	7	7	30

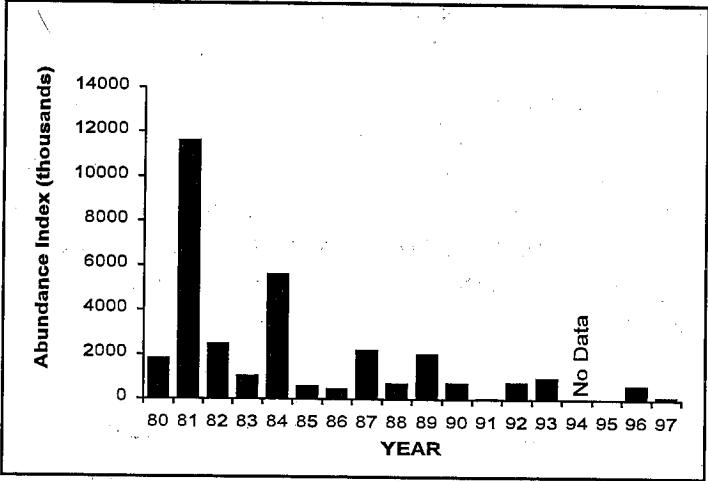


Figure 1. Abundance Indices of Age-0 Walleye Surperch in the Midwater Trawl, 1980 to 1997

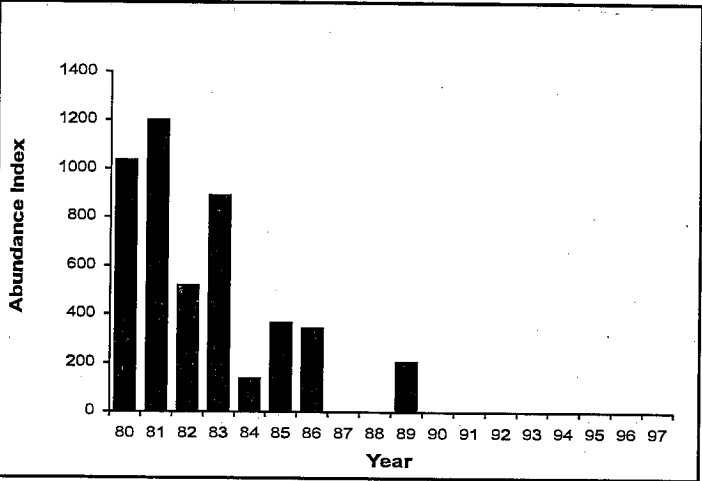


Figure 2. Abundance Indices of Age-0 Pile Perch in the Otter Trawl, 1980 to 1997

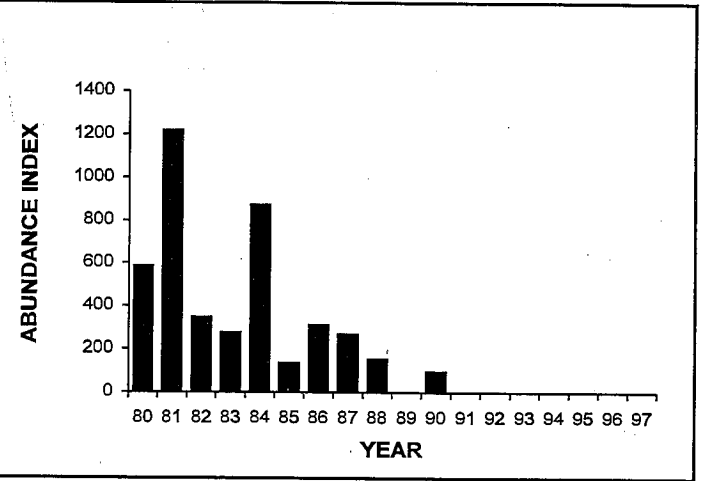


Figure 3. Abundance Indices of All Age Classes of White Seaperch in the Otter Trawl, 1980 to 1997

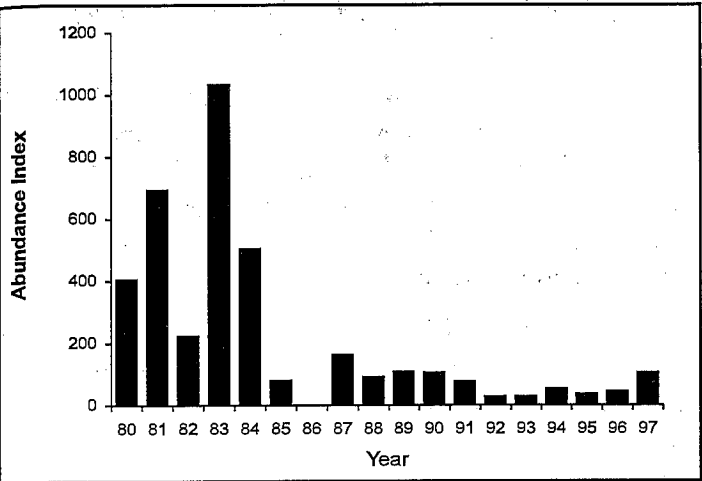


Figure 4. Abundance Indices of All Age Classes of Barred Surfperch in the Otter Trawl, 1980 to 1997

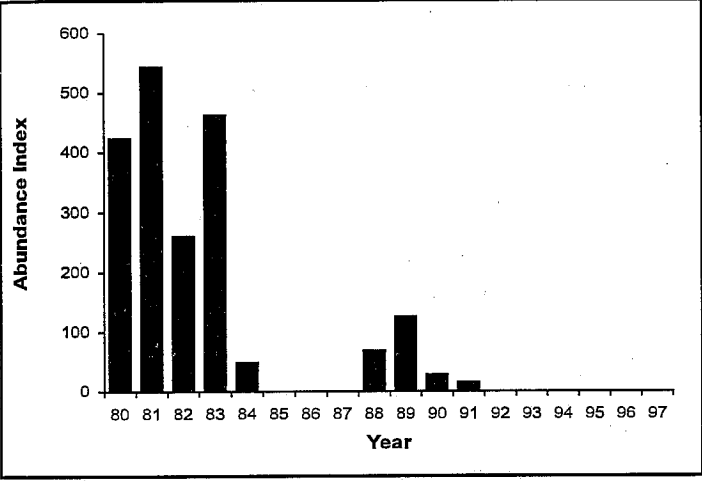


Figure 5. Abundance Indices of All Age Classes of Dwarf Perch in the Otter Trawl, 1980 to 1997

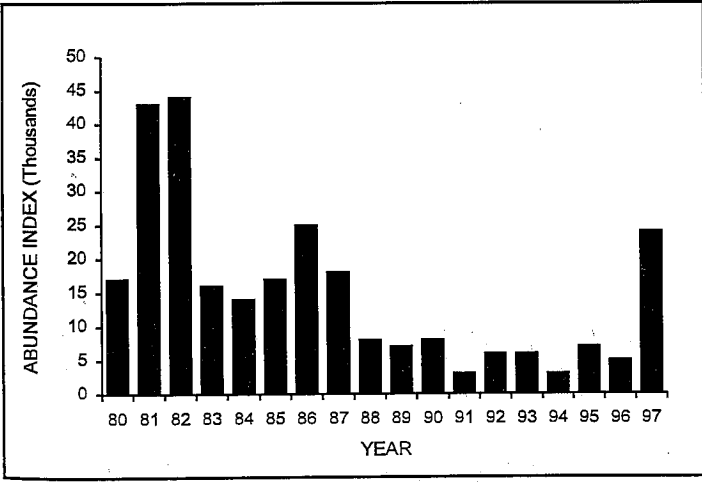


Figure 6. Abundance Indices of Age-0 Shiner Perch in the Otter Trawl, 1980 to 1997

### Young Striped Bass

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The summer townet survey measures an index of striped bass abundance when the catch mean length is 38 mm. In 1997 the abundance index was 1.6, the lowest of the survey's 38 year history (Figure 1). The index was much lower than expected for the third consecutive year, based on mean April-July delta outflow. Results from 1997 were similar to those of 1996, when we reported a similar unusually low young striped bass index, 2.1, for the water year type (discussed in the Autumn 1996 IEP newsletter).

The fall midwater trawl survey (FMWT) measures abundance of young striped bass and other species of interest. The FMWT has been conducted annually since

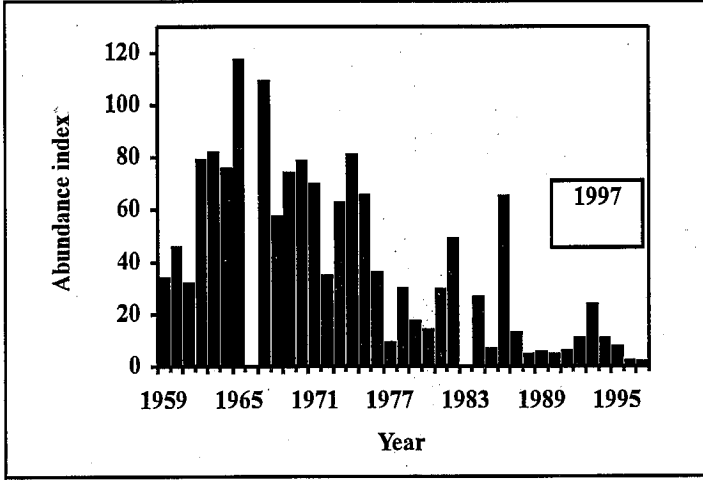


Figure 1. Summer Townet Survey of Striped Bass, 1959 to 1997

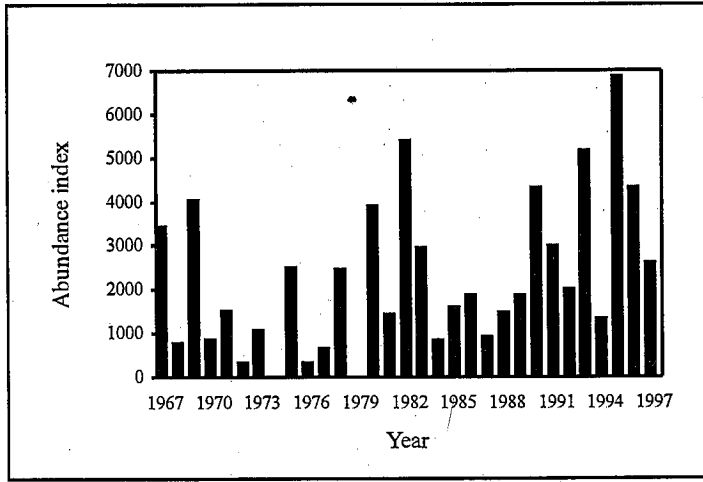


Figure 2. The 1997 FMWT Abundance Index for Young Stripped Bass